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### REMARKS

Claims 1-13 are all the claims presently pending in the application.

Entry of this §1.116 Amendment is proper. Since the amendments above narrow the issues for appeal and since such features were in the claims earlier, such amendments do not raise a new issue requiring a further search and/or consideration by the Examiner. As such, entry of this Amendment is believed proper and is earnestly solicited.

It is noted that the claims have been amended solely to more particularly point out Applicant's invention for the Examiner, and not for distinguishing over the prior art, narrowing the claim in view of the prior art, or for statutory requirements directed to patentability.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Attached hereto is a marked-up version of the changes made to the Specification and/or claims by the current Amendment. The attached pages are captioned "Version with markings to show changes made".

The Examiner objects to claims 11-13. Applicant submits that the amendments to the claims above address the Examiner's concerns and thus Applicant requests that the Examiner reconsider and withdraws this objection to claims 11-13.

Claims 1-4 and 6-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Knop, et al. (U.S. Patent No. 4,251,137) (hereinafter "Knop").

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over in view of Ohe et al. (U.S. Patent No. 6,295,110B1) (hereinafter "Ohe").

These rejections are respectfully traversed in the following discussion.

### I. THE CLAIMED INVENTION

The invention was discussed in detail in the Amendment filed on November 14, 2002, and incorporated herein by reference. For convenience, the Examiner is referred thereto.

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Applicant's invention, as defined for example in a non-limiting embodiment of independent claim 1 (and substantially similarly by independent method claim 7) is directed to a liquid crystal display device including a first substrate formed with display pixel electrodes thereon, the first substrate having a first irregular surface including line-shaped protrusions extending in one direction.

A second substrate is arranged in an opposing relation to the first substrate and includes a second irregular surface including line-shaped protrusions extending perpendicularly to the one direction.

Further, in the present invention, the line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate.

With such features, a direction of thickness distribution or irregularity distribution of a first substrate becomes orthogonal to a direction of thickness or irregularity of a second substrate when, for example, the substrates are laid one on the other during a fabrication process of a liquid crystal display panel.

None of the cited references is pertinent at all to the claimed combination, and nowhere discloses or suggest the technical inventive concept of the present invention. Indeed, the present invention is based upon the fact that a direction dependency of a thickness of the raw glass substrate or mother board is unavoidable. Specifically, in a non-limiting embodiment as defined by independent claim 1 (and substantially similarly by independent claims 7), "said line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate".

As discussed in the Amendment filed on November 14, 2002, with the present invention an increase of a distance between positions at which the thick portions of the two substrates overlap and the thin portions of the two substrates overlap can be increased. Thus, a variation within a display is reduced and a defect rate improved.

The conventional systems, such as those discussed below and in the Related Art section of the present application, do not have such a structure, and fail to provide for such an operation (e.g., see page 6, lines 12-17; page 10, lines 13-18; page 11, lines 8-24; and page 12, lines 14-20; page 18, lines 21-27; and page 19, lines 1-10 of the present application).

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Such features are not taught or suggested by any of the cited references.

## II. THE PRIOR ART REFERENCE

### A. The Knop Reference

The Examiner asserts:

*[regarding claims 1-4 and 6-10] Knop et al. teach (Fig. 4, col. 3 line 59 to col. 4 line 16) liquid crystal display device comprising the first substrate (grading (sic) substrate 402) having a first irregular surface including line-shaped protrusions extending in one direction; a second substrate 400 arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction for regulating contrast ratio.*

*Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify liquid crystal display device as applicants admitted with a first irregular surface including line-shaped protrusions extending in one direction; a second substrate arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction for regulating contrast ratio.*

However, Applicant again respectfully disagrees and submits that the Examiner's assertions are erroneous.

Prior to discussing the Examiner's assertions regarding Knop, Applicant respectfully notes that in the present invention an "irregular surface" is present on a first and second substrate. This irregular surface is the consequence of drawing on a glass substrate in a fabrication process. In Knop, such a fabrication process is not disclosed nor is it an object of Knop. As such, Knop does not disclose or suggest an irregular surface as in the present invention.

Applicant notes, turning to Webster's New Universal Unabridged Dictionary,

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Copyright © 1996 by Random House Value Publishing, Inc., p.1009, “*irregular*” is defined as “*without symmetry, even shape, formal arrangement, etc.: an irregular pattern. 2. Not characterized by any fixed principle, method, continuity, or rate; irregular intervals*” (see Exhibit I).

As discussed in detail in the Amendment filed on November 14, 2002, Knop is not pertinent to the claimed invention. Nowhere does Knop (e.g., or for that matter Ohe) teach or suggest the directional dependency of a thickness of a raw glass substrate or motherboard, as defined by the claims of the present invention.

That is, Knop (e.g., either alone or in combination (arguendo) with Ohe) does not teach or suggest that “line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate”.

Instead, Knop as shown in Fig. 4, shows a tunable diffractive-subtractive color filter for a projector having a first grating 400 and a second grating 402 with a regular surface pattern. The disclosure by Knop of such a regular surface pattern is no surprise since the structure of Knop is obtained by purposely machining the grating structure surfaces. Thus, in Knop there is disclosed “*a fixed, predetermined-waveform profile surface relief pattern*” (e.g., see column 1, lines 27-29 of Knop). Further, Knop discloses “*the physical amplitude a' of gratings 406 and 408 may be selected to be substantially equal to the quotient of 280 nm divided by the absolute value of the difference between the index of refraction n for parallel polarized light and no*” (e.g., see column 4, lines 8-13 of Knop).

Thus, in Knop a grating structure is regular, fixed, and pre-determined.

Nowhere does Knop disclose that a grating structure and its protrusions are dependent upon a “direction dependency of a thickness of the raw glass substrate”, as in the present invention. In fact, as discussed in the Amendment filed on November 14, 2002, the object of Knop has nothing to do with “line-shaped protrusions along a drawing direction of a raw glass substrate....formed due to a direction dependency of a thickness of the raw glass substrate”.

That is, in contrast to the present invention, the regular surface of Knop is not intrinsic to a substrate. Again, Knop's regular surface of the substrate must be formed affirmatively and purposely to provide the grating line grooves.

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Hence, turning to the clear language of the claims, there is no teaching or suggestion of “[a] liquid crystal display device comprising:

*a first substrate formed with display pixel electrodes thereon, said first substrate having a first irregular surface including line-shaped protrusions extending in one direction;*

*a second substrate arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction; and*

*liquid crystal disposed between said first substrate and said second substrate,*

*wherein said line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate”*

(emphasis Applicant's).

For the reasons stated above, independent claim 1 (and substantially similarly independent claims 7 and 11) of the claimed invention are fully patentable over Knop.

Further, dependent claims 2-3, 6, 9-10, and 12-13 when taken in combination with claims 1, 7, and 11 define additional novel limitations.

Further, with regard to dependent claim 5, rejected under 35 U.S.C. 103(a) as being unpatentable over Knop in view of Ohe, as discussed in detail in the Amendment filed on November 14, 2002, this claim provides additional limitations, which in combination with those of independent claim 1, are neither taught nor suggested by Knop and Ohe. That is, there is no teaching or suggestion of an “irregular surface” and “said line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate””, as in the present invention.

Therefore, these references either alone or in combination are much different from the present invention and fail to teach or suggest the claimed invention.

For the reasons stated above, the claimed invention is fully patentable over the cited references.

Additionally, regarding the rejection of claims 1-4 and 6-13 under 35 U.S.C. § 103(a) as being unpatentable over Knop, et al., the Applicant respectfully requests that the Examiner indicate specifically where in the Knop et al. reference that support may be found for “line-shaped protrusions are formed due to a direction dependency of a thickness of a raw

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glass substrate" as asserted on page 4 of the Office Action.

### III. FORMAL MATTERS AND CONCLUSION

Applicant again notes with regards to the Examiner's objection to the drawings with reference to claims 3 and 11, that as shown in Fig. 7A and as clearly described in the specification (e.g., see page 13, lines 5-9), a TFT 503 is a switching element. Further, as shown in Fig. 7B and as clearly described in the specification (e.g., see page 13, lines 21-25), a matrix shaped light shield film 203 is provided on a second substrate 101 and a color layer 142 necessary for color display is formed on the light shield film 203.

Regarding the Examiner's objection to the drawings with reference to claim 5, Applicant notes that as shown in Fig. 7A and Fig. 7B and as clearly described in the specification (e.g., see page 13, lines 14-15), a common electrode 106 and a pixel electrode are arranged parallel to each other in an alternating sequence.

Regarding the Examiner's objection to the drawings with reference to claim 11, the claim has been amended above to define "*wherein line-shaped protrusions along a drawing direction of a raw glass substrate are formed due to a direction dependency of a thickness of the raw glass substrate*". Thus, the drawings indeed do show the line-shaped protrusions along a drawing direction of a raw glass substrate. Further, regarding the "*irregular surface*", Applicant notes that the drawings are not drawn to a particular scale, and therefore the length between troughs defining the line-shaped protrusions is not drawn as a regular pattern shape. That is, as described in the specification (e.g., see page 17, lines 14-15), the thickness distribution is repeated with random interval.

Thus, Applicant again respectfully submits that the drawings taken as a whole in fact do show every feature of the claimed invention. It is noted that Rule 83(a) does not require that a single drawing show all claimed features.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the objection to the drawings.

In view of the foregoing, Applicant submits that claims 1-13, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in

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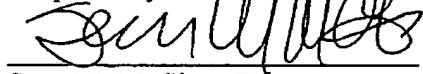
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condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,



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**CERTIFICATION OF FACSIMILE TRANSMISSION**

I hereby certify that I am filing this Amendment by facsimile with the United States Patent and Trademark Office to Examiner Hoan C. Nguyen, Group Art Unit 2871 at fax number (703) 872-9319 this 26<sup>th</sup> day of March, 2003.



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

**The claims have been amended as follows:**

1. (Amended) A liquid crystal display device comprising:
  - 2 a first substrate formed with display pixel electrodes thereon, said first substrate having a first irregular surface including line-shaped protrusions extending in one direction;
  - 4 a second substrate arranged in an opposing relation to said first substrate, said
  - 5 second substrate having a second irregular surface including line-shaped protrusions
  - 6 extending perpendicularly to said one direction; and
  - 7 liquid crystal disposed between said first substrate and said second substrate,
  - 8 wherein said line-shaped protrusions along a drawing direction of a raw glass
  - 9 substrate are formed due to a direction dependency of a thickness of [a] the raw glass
  - 10 substrate.
- 1 7. (Amended) A fabrication method of a liquid crystal display device, comprising:
  - 2 cutting apart a first rectangular substrate from a first raw glass substrate having a
  - 3 belt-shaped irregularity such that a longer side direction of said first rectangular substrate is
  - 4 coincident with a drawing direction of said first raw glass substrate;
  - 5 cutting apart a second rectangular substrate from a second raw glass substrate having
  - 6 a belt-shaped irregularity such that a longer side direction of said second rectangular substrate
  - 7 becomes orthogonal to a drawing direction of said second raw glass substrate; and
  - 8 arranging said first rectangular substrate in an opposing relation to said second
  - 9 rectangular substrate with a gap formed therebetween to accept a liquid crystal layer and with
  - 10 the longer sides of said first and second rectangular substrates being in the same direction,
  - 11 wherein line-shaped protrusions along a drawing direction of said first and second
  - 12 raw glass substrates are formed due to a direction dependency of respective thicknesses of
  - 13 said first and second raw glass substrates.

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- 1 11. (Amended) A fabrication method of a liquid crystal display device, comprising:
  - 2 cutting apart a first rectangular substrate from a first raw glass substrate having a
  - 3 belt-shaped irregularity such that a longer side direction of said first rectangular substrate is
  - 4 coincident with a drawing direction of said first raw glass substrate;
  - 5 cutting apart a second rectangular substrate from a second raw glass substrate having
  - 6 a belt-shaped irregularity such that a longer side direction of said second rectangular substrate
  - 7 becomes orthogonal to a drawing direction of said second raw glass substrate; and
  - 8 arranging said first rectangular substrate in an opposing relation to said second
  - 9 rectangular substrate with a gap formed therebetween to accept a liquid crystal layer and with
  - 10 the longer sides of said first and second rectangular substrates being in the same direction,
  - 11 wherein line-shaped protrusions along a drawing direction of a raw glass substrate
  - 12 are formed due to a direction dependency of a thickness of [a] the raw glass substrate, and
  - 13 wherein a plurality of said first rectangular substrates are cut apart from said first
  - 14 raw glass substrate in said cutting apart said first rectangular substrate and a plurality of said
  - 15 second rectangular substrates are cut apart from said second raw glass substrate in said
  - 16 cutting apart said second rectangular substrate,
  - 17 said method further comprising before said cutting said first and second rectangular
  - 18 substrates, forming electrodes and switching elements on each of said first rectangular
  - 19 substrates and the step of forming a color filter layer on each of said second rectangular
  - 20 substrates.
12. (Amended) A fabrication method of a liquid crystal display device, as claimed in claim 7, wherein a distance between [positions at which pressure differences between] a position of highest pressure between said first rectangular substrate and said second rectangular substrate and a position of smallest pressure between said first rectangular substrate and said second rectangular substrate [are largest] is increased, and  
wherein a rate of variation of a gap between said first rectangular substrate and said second rectangular substrate is decreased.

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13. (Amended) A fabrication method of a liquid crystal display device, as claimed in claim 11, wherein a distance between [positions at which pressure differences between] a position of highest pressure between said first rectangular substrate and said second rectangular substrate and a position of smallest pressure between said first rectangular substrate and said second rectangular substrate [are largest] is increased, and

wherein a rate of variation of a gap between said first rectangular substrate and said second rectangular substrate is decreased.

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